Introduction to Algebra
Practice Final Exam

#1 Solve: $5x - 48 + 7x = -12$

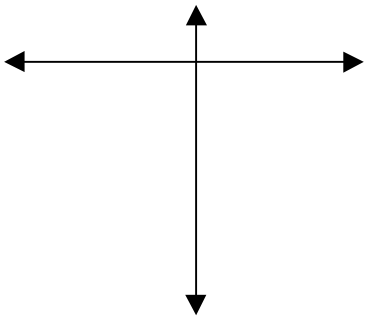
#2 Solve: $\frac{1}{2}x - \frac{1}{10} = \frac{1}{5}x + \frac{1}{2}$

#3 Solve: $-8 - 2(3 - a) = 0$

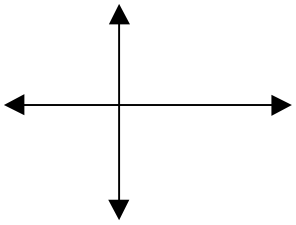
#4 Solve for y: $2x + 5y = 20$

#5 Rewrite the equation in standard form: $y = \frac{2}{3}x + 1$

#6 Graph: $y = 2x - 4$



#7 Graph: $x - y = -1$



#8 Find the slope of a line through (6,4) and (-3,-7).

#9 Find the equation of the line through (-5,2) and with $m = -\frac{1}{3}$.

#10 Graph the system of equations. Identify the solution to the system of equations.

$x + 2y = 8$
$x - 2y = 4$
$x = 6$

#11 Solve the system of equations.

$x + 2y = 6$
$3x - 2y = -22$

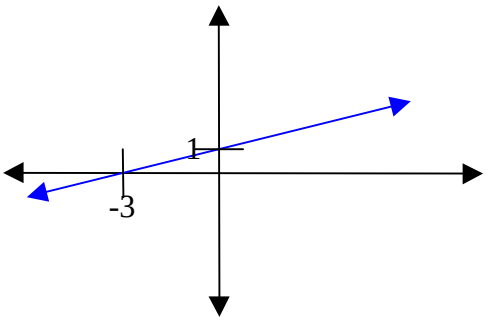
#12 Select the equation that matches the graph.

A) y = 3x + 1

B) y = -3x + 1

C) y = 3x + 3

D) y = ⅓x + 1



#13 Determine the appropriate description that matches the system of equations.

$$y = 3x + 2$$
$$y = -3x - 2$$

A) parallel lines with no solution

B) parallel lines with one solution

C) intersecting lines with one solution

D) same line with infinite many solutions

#14 Simplify the expression. Write answer with positive exponents.

$$\left(ab^2c^3\right)^4$$

#15 Simplify the expression. Write answer with positive exponents.

$$\frac{x^4y^2}{x^2y^4}$$

#16 Simplify the expression. Write answer with positive exponents.

$$\frac{(xy^2)^{-2}}{(x^2y^3)^{-1}}$$

#17 Combine the polynomial.

$$(-5x^2+3x-7)-(6x^2-8x+11)$$

#18 Multiply.

$$(x+7)(2x-1)$$

#19 Multiply.

$$\left(4x+\frac{1}{2}\right)^2$$

#20 Multiply.

$$\left(2x-\frac{2}{3}\right)\left(2x+\frac{2}{3}\right)$$

#21 Factor completely.

$5x^2 - 5x - 60$

#22 Factor completely.

$81 - x^4$

#23 Factor completely.

$18a^2b - 50b$

#24 Simplify.

$$\frac{x^2 + 9x + 20}{x^2 + 5x + 6} \div \frac{x + 4}{x + 2}$$

#25 Use the quadratic formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, to solve the equation.

$x^2 - x + 1 = 0$

SOLUTIONS

#1 Solve:

$$5x-48+7x=-12$$
$$5x+7x=-12+48$$
$$12x=36$$
$$\frac{12x}{12}=\frac{36}{12}$$
$$x=3$$

#2 Solve:

$$\frac{1}{2}x-\frac{1}{10}=\frac{1}{5}x+\frac{1}{2}$$
$$10\left(\frac{1}{2}x-\frac{1}{10}=\frac{1}{5}x+\frac{1}{2}\right)$$
$$\frac{10}{2}x-\frac{10}{10}=\frac{10}{5}x+\frac{10}{2}$$
$$5x-1=2x=5$$
$$3x-1=5$$
$$3x=6$$
$$x=2$$

#3 Solve:

$$-8-2(3-a)=0$$
$$-8-6+2a=0$$
$$-14+2a=0$$
$$2a=14$$
$$a=7$$

#4 Solve for y:

$$2x+5y=20$$
$$5y=-2x+20$$
$$\frac{5y}{5}=\frac{-2x}{5}+\frac{20}{5}$$
$$y=-\frac{2}{5}x+4$$

#5 Rewrite the equation in standard form:

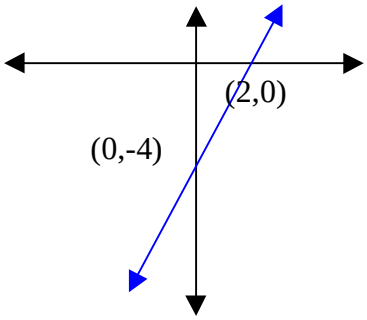
$$y = \frac{2}{3}x + 1$$

$$-\frac{2}{3}x + y = 1$$

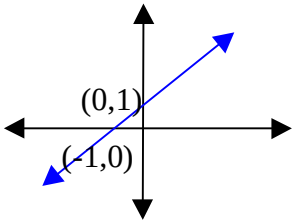
$$-3\left(-\frac{2}{3}x + y = 1\right)$$

$$2x - 3y = -3$$

#6 Graph: $y = 2x - 4$



#7 Graph: $x - y = -1$



#8 Find the slope of a line through (6,4) and (-3,-7).

$$m = \frac{4-(-7)}{6-(-3)}$$

$$m = \frac{4+7}{6+3}$$

$$m = \frac{11}{9}$$

#9 Find the equation of the line through (-5,2) and with $m = -\frac{1}{3}$.

$y = mx + b$

$2 = -\frac{1}{3}(-5) + b$

$2 = \frac{5}{3} + b$

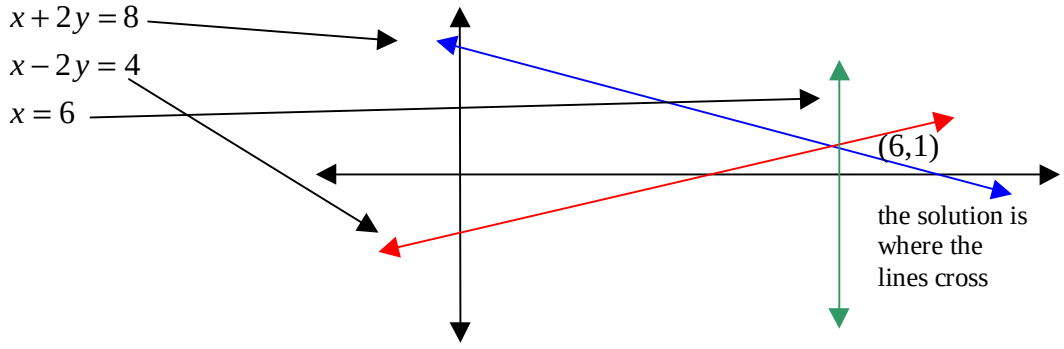
$2 - \frac{5}{3} = b$

$\frac{6}{3} - \frac{5}{3} = b$

$\frac{1}{3} = b$

$y = -\frac{1}{3}x + \frac{1}{3}$

#10 Graph the system of equations. Identify the solution to the system of equations.



#11 Solve the system of equations.

$$x + 2y = 6$$
$$3x - 2y = -22$$
$$4x + 0y = -16$$

$$4x = -16$$
$$x = -4$$

$$-4 + 2y = 6$$
$$2y = 10$$
$$y = 5$$

Solution: (-4,5)

#12 Select the equation that matches the graph.

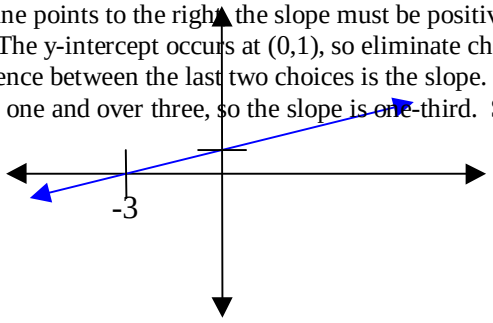
A) y = 3x + 1

B) y = -3x + 1

C) y = 3x + 3

D) y = ⅓x + 1

Since the line points to the right, the slope must be positive, so eliminate choice B. The y-intercept occurs at (0,1), so eliminate choice C. The only difference between the last two choices is the slope. The line has a slope of up one and over three, so the slope is one-third. Select choice D.



#13 Determine the appropriate description that matches the system of equations.

$$y = 3x + 2$$
$$y = -3x - 2$$

A) parallel lines with no solution

B) parallel lines with one solution

C) intersecting lines with one solution

D) same line with infinite many solutions

The lines have different slopes, so they cannot be the same line nor can they be parallel. Two different lines that are not parallel will intersect and have one solution, so choose choice C.

#14 Simplify the expression. Write answer with positive exponents.

$$\left(ab^2c^3\right)^4$$
$$a^4b^{2\cdot4}c^{3\cdot4}$$
$$a^4b^8c^{12}$$

#15 Simplify the expression. Write answer with positive exponents.

$$\frac{x^4y^2}{x^2y^4}$$
$$x^{4-2}y^{2-4}$$
$$x^2y^{-2}$$
$$x^2\cdot\frac{1}{y^2}$$
$$\frac{x^2}{y^2}$$

#16 Simplify the expression. Write answer with positive exponents.

$$\frac{\left(xy^2\right)^{-2}}{\left(x^2y^3\right)^{-1}}$$
$$\frac{x^{-2}y^{2\cdot-2}}{x^{2\cdot-1}y^{3\cdot-1}}$$
$$\frac{x^{-2}y^{-4}}{x^{-2}y^{-3}}$$
$$x^{-2--2}y^{-4--3}$$
$$x^{-2+2}y^{-4+3}$$
$$x^0y^{-1}$$
$$1\cdot\frac{1}{y^1}$$
$$\frac{1}{y}$$

#17 Combine the polynomial.

$$\left(-5x^2+3x-7\right)-\left(6x^2-8x+11\right)$$
$$-5x^2+3x-7-6x^2+8x-11$$
$$-11x^2+11x-18$$

#18 Multiply.

$$(x+7)(2x-1)$$
$$2x^2-x+14x-7$$
$$2x^2+13x-7$$

#19 Multiply.

$$\left(4x+\frac{1}{2}\right)^2$$
$$(4x)^2+2\cdot\frac{1}{2}\cdot 4x+\left(\frac{1}{2}\right)^2$$
$$16x^2+4x+\frac{1}{4}$$

#20 Multiply.

$$\left(2x-\frac{2}{3}\right)\left(2x+\frac{2}{3}\right)$$
$$(2x)^2-\left(\frac{2}{3}\right)^2$$
$$4x^2-\frac{4}{9}$$

#21 Factor completely.

$$5x^2-5x-60$$
$$5\left(x^2-x-12\right)$$
$$5(x-4)(x+3)$$

#22 Factor completely.

$81 - x^4$

$(9 - x^2)(9 + x^2)$

$(3 - x)(3 + x)(9 + x^2)$

#23 Factor completely.

$18a^2b - 50b$

$2b(9a^2 - 25)$

$2b(3a + 5)(3a - 5)$

#24 Simplify.

$$\frac{x^2 + 9x + 20}{x^2 + 5x + 6} \div \frac{x + 4}{x + 2}$$

$$\frac{(x + 4)(x + 5)}{(x + 2)(x + 3)} \cdot \frac{x + 2}{x + 4}$$

$$\frac{(x + 4)(x + 5)(x + 2)}{(x + 2)(x + 3)(x + 4)}$$

$$\frac{(x + 5)}{(x + 3)}$$

#25 Use the quadratic formula, $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, to solve the equation.

$x^2 - x + 1 = 0$

$$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4 \cdot 1 \cdot 1}}{2 \cdot 1}$$

$$x = \frac{1 \pm \sqrt{1 - 4}}{2}$$

$$x = \frac{1 \pm \sqrt{-3}}{2}$$

no real solution